



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|-----------------|-------------|----------------------|---------------------|------------------|
| 10/633,130 | 08/01/2003 | Paul E. Fischione | 129/015 | 3089 |

7590

09/07/2005

Philip E. Levy, Esq.
Barry I. Friedman, Esq.
Metz Lewis LLC
11 Stanwix Street, 18th Floor
Pittsburgh, PA 15222

EXAMINER

VERSTEEG, STEVEN H

ART UNIT

PAPER NUMBER

1753

DATE MAILED: 09/07/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/633,130

Applicant(s)

FISCHIONE ET AL.

Examiner

Steven H. VerSteeg

Art Unit

1753

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 09 January 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-164 is/are pending in the application.
- 4a) Of the above claim(s) 152-157 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) See Continuation Sheet is/are rejected.
- 7) ☒ Claim(s) 22,24,26-28,30,31,46,48,50-54,56,75,91,97,101,123-126,133-137 and 142-150 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 01 August 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date <u>8/1/03</u> . | 6) <input type="checkbox"/> Other: _____ |

Continuation of Disposition of Claims: Claims rejected are 1-21,23,25,29,32-45,47,49,55,57-74,76-90,92-96,98-100,102-115,117-122,127-129,131,132,138-141,151 and 158-164.

DETAILED ACTION

Election/Restrictions

1. Restriction to one of the following inventions is required under 35 U.S.C. 121:
 - I. Claims 1-151 and 158-164, drawn to an apparatus, classified in class 204, subclass 298.04.
 - II. Claims 152-157, drawn to a method, classified in class 204, subclass 192.11.

The inventions are distinct, each from the other because of the following reasons:

2. Inventions I and II are related as process and apparatus for its practice. The inventions are distinct if it can be shown that either: (1) the process as claimed can be practiced by another materially different apparatus or by hand, or (2) the apparatus as claimed can be used to practice another and materially different process. (MPEP § 806.05(e)). In this case the process as claimed could be performed in a materially different apparatus such as an apparatus containing CVD and ion beam sputter etching.
3. Because these inventions are distinct for the reasons given above and have acquired a separate status in the art as shown by their different classification, restriction for examination purposes as indicated is proper.
4. During a telephone conversation with Barry Friedman on August 5, 2005 a provisional election was made without traverse to prosecute the invention of Group I, claims 1-151 and 158-164. Affirmation of this election must be made by applicant in replying to this Office action. Claims 152-157 withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

Art Unit: 1753

5. Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application. Any amendment of inventorship must be accompanied by a request under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(i).

Specification

6. The lengthy specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

Claim Rejections - 35 USC § 112

7. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

8. Claims 23, 25, 29, 47, 49, 57, 92, and 117 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

9. The parenthesis in claims 23, 29, 47, 49, 57, 92, and 117 render the claims unclear because it is unclear if the subject matter within the parenthesis are limitations.

10. Claim 25 depends from itself and is therefore indefinite.

Claim Rejections - 35 USC § 103

11. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are

Art Unit: 1753

such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

12. Claims 1-21, 32-45, 55, 58-74, 76-90, 93-96, 98-100, 102-115, 118-122, 127-129, 131, 132, 138-141, 151, and 158-164 are rejected under 35 U.S.C. 103(a) as being unpatentable over US 6,434,814 B1 to Chang et al. (Chang) in view of US 6,699,374 B2 to Marshall, US 6,261,406 B1 to Jurgensen et al. (Jurgensen), and US 6,203,620 B1 to Moslehi.

13. For claim 1, Applicant requires an apparatus comprising a plasma generator for plasma cleaning a specimen; means for coating the specimen with a conductive material; wherein the plasma cleaning of the specimen and the coating of the specimen may be performed under continuous vacuum conditions.

14. For claim 32, Applicant requires an apparatus comprising a plasma generator for plasma cleaning the specimen; means for removing material from the specimen; wherein the plasma cleaning of the specimen and the removing material from the specimen may be performed under continuous vacuum conditions.

15. For claim 55, Applicant requires an apparatus comprising means for coating a specimen with a conductive material; and means for plasma etching the specimen; wherein the coating of the specimen and the plasma etching of the specimen may be performed under continuous vacuum conditions.

16. For claim 90, Applicant requires an apparatus comprising a first vacuum chamber; a second vacuum chamber connected to the first vacuum chamber; a specimen stage moveable between a first position and a second position under continuous vacuum conditions with the first position being inside the first chamber and the second position inside the second chamber; means

Art Unit: 1753

for coating the specimen with a conductive material supported by the first chamber; and means for plasma etching the specimen supported by the second chamber.

17. For claim 108, Applicant requires an apparatus comprising a vacuum chamber; an ion source connected to the vacuum chamber directing an ion beam at the specimen for etching; a plasma etching assembly connected to the vacuum chamber for plasma etching; means for coating the specimen with a conductive material supported by the vacuum chamber; wherein the etching, plasma etching, and coating may be performed under continuous vacuum conditions.

18. Chang discloses various processes that can be used to process a substrate including sputter deposition, magnetron sputter deposition, and ion beam sputter deposition. Chang also discloses various subtractive processes that can be performed including sputter etching, reactive ion etching, ion beam milling, and reactive ion beam milling (col. 6, l. 57-62). Such processes are beneficial when producing a magnetic head (abstract).

19. Chang does not disclose the apparatus of the deposition or plasma cleaning, or how to make the plasma necessary for the processes.

20. Marshall discloses an in line multi chamber apparatus (Figure 9). Such an apparatus includes a substrate platen that moves the substrate throughout the system (col. 3, l. 35-42). The apparatus includes a magnetron sputter target containing a metal target (col. 4, l. 7-12; l. 50-54). In an in-line system, different chambers perform different processes as desired. Having all of the processes in an in-line system is inherently more efficient because the substrate would be under a continuous vacuum. One particular chamber can be a plasma cleaning chamber (col. 7, l. 63 – col. 8, l. 1) by plasma etching.

Art Unit: 1753

21. It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the invention of Chang to utilize the in-line system taught by Marshall because of the desire to have greater efficiency.

22. Moslehi discloses that for any plasma process such as plasma etching and surface cleaning, for example, it is beneficial to utilize an ICP source that contains gas inlet tubes 512 surrounded by RF coil segments 518 that produces excellent plasma density and ion flux uniformity (Figure 15; col. 6, l. 49-67; col. 3, l. 7-9).

23. It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the invention of Chang to utilize the ICP source of Moslehi to plasma clean because of the desire to have excellent plasma density.

24. Jurgensen discloses that plasma processes involve supplying some sort of power such as capacitively coupled RF power or inductively coupled RF power (col. 4, l. 51-59).

25. It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the invention of Chang to utilize capacitively or inductively coupled plasma power because it is the conventional power supply for plasma systems.

26. For claim 2, Applicant requires means for removing material from the specimen. For claims 3, 33, 68, and 69, Applicant requires the means for removing to comprise means for etching using an ion beam. For claims 4 and 34, Applicant requires an ion source. For claims 5 and 35, Applicant requires a source of process gas adjacent the ion source. As noted above, Chang discloses ion beam etching. Inherently, the ion beam etching would involve a process gas and an ion source else the beam would have no source and there would be nothing to ionize the beam.

Art Unit: 1753

27. For claims 6, 66, and 98, Applicant requires the means for coating to comprise a magnetron sputtering device. Chang discloses the limitation as noted above.

28. For claims 7, 67, 99, 119, and 129, Applicant requires the means for coating to comprise an ion source for directing an ion beam at a target with the target formed of the conductive material. For claim 120, Applicant requires reactive ion beam etching. For claims 73 and 100, Applicant requires the ion source to selectively direct the ion beam at the specimen. For claim 59, Applicant requires means for plasma etching to comprise a first electrode and a second electrode. When the ion beam is on, it is selectively directed at the target versus when it is off. Chang discloses that the deposition can be ion beam sputtering. In ion beam sputtering, there is inherently a target (else there is nothing to sputter), and there must be an ion source inherently else there is no ions. Chang also discloses reactive ion beam etching. The second electrode is the grounded substrate and the first electrode is the biased target.

29. For claims 96 and 121, Applicant requires capacitive discharge with an alternating voltage. For claim 64, Applicant requires an alternating voltage source. Chang applies an RF bias (col. 7). For claim 122, Applicant requires a sample stage for holding the specimen with part of the stage comprising a second electrode. Chang grounds the wafer during reactive ion beam etching and regular ion beam etching (col. 7, l. 10-23). When the substrate is grounded, it is effectively an anode and hence, a second electrode.

30. For claims 8, 11, 36, 105, and 106, Applicant requires a first and second chamber connected with a vacuum valve. For claim 107, there is a baffle instead of a valve. For claim 74, Applicant requires the specimen stage to be moved from a first position to a second position so that the substrate passes within a pass of the beam. Marshall discloses the use of multiple

Art Unit: 1753

chambers in an in-line system (Figure 9). For the individual processing of the substrate, the chamber has an entry chamber, vacuum chamber, and exit chamber in which the substrate is passed back and forth in order to build up the thickness (col. 7, l. 5-8). When multiple coatings are involved, each chamber would then have an entry and exit chamber so that the vacuum chamber would be isolated from other process chambers.

31. For claims 9, 12, 14, 15, 37, 39, 70-72, 88, and 89, Applicant requires the plasma generator in the first chamber and the coating in the second chamber. The different chambers would have different processes in an in line system according to Marshall (col. 7, l. 63 – col. 8, l. 16).

32. For claims 10, 13, and 38, Applicant requires a transfer support for supporting the specimen and transferring it between the chambers. The substrate platen in Marshall meets the limitation.

33. For claims 76, 82, 102, and 109, Applicant requires a plasma generator for plasma cleaning the specimen. For claim 103, Applicant requires the plasma generator to be supported by the first vacuum chamber. For claim 104, Applicant requires the plasma generator to be supported by the second vacuum chamber. As noted above, the limitation is obvious. Regarding the vacuum chambers, any chamber can arbitrarily be labeled the first or second chamber.

34. For claims 16, 40, 77, 83, and 110, Applicant requires the plasma generator to comprise a plasma tube, a coil wrapped around the tube, and an RF power supply. For claim 111, Applicant requires a source of process gas connected to the tube. The gas has to come from somewhere, thus, it is obvious. Moslehi discloses the limitation as noted above.

Art Unit: 1753

35. For claims 21 and 45, Applicant requires a first vacuum pump connected to the first chamber and a second pump connected to the second chamber. Because the chamber are isolated by the valve in the in line system, each chamber would inherently have its own vacuum pump.

36. For claim 118, Applicant requires a load lock chamber connected to the vacuum chamber. Marshall discloses the limitation (Figure 9).

37. For claim 127, Applicant requires two or more gas inlets with two or more gases. For claim 128, Applicant requires at least oxygen. Chang uses argon and oxygen (col. 7-8) and Moslehi teaches using multiple gas inlets (Figure 15).

38. For claims 61 and 138, Applicant requires a sample stage. For claim 61, the stage is an electrode. Marshall discloses using a substrate platen. The grounded substrate acts as an anode.

39. For claim 139, Applicant requires the stage to be moveable to a plurality of processing positions. For claim 62, Applicant requires the stage to be moveable perpendicular to a planer surface of the first electrode. For claim 63, the electrode moves perpendicular to the second electrode. Marshall discloses the limitations for moving and Chang discloses using multiple processes. Marshal shows the substrate movement.

40. For claim 140, Applicant requires the stage to be moved automatically based upon parameters set by the user. For claim 141, Applicant requires an order of movement. The platen is moved based upon when an operation is completed. The operation is completed when a sufficient thickness has been applied. The user decides the thickness. The user selects what to deposit and hence, the order.

Art Unit: 1753

41. For claim 151, Applicant requires a first aperture adjacent the plasma generator and a second aperture adjacent the etching assembly with a shutter for each. The vacuum valve that closes the chambers acts as a shutter to close the tunnel to the adjacent chamber.

42. For claims 17, 41, 78, 84, and 112 Applicant requires a source of process gas including oxygen. For claims 18, 42, 79, 85, and 113 Applicant requires argon. For claims 19, 43, 80, 86, and 114 the mixture is 75% argon and 25% oxygen. For claims 20, 44, 81, 87, and 115 Applicant requires a non-reactive process gas. Chang discloses using a mixture of oxygen and argon in the plasma (col. 8, l. 64-66), which is almost 75% argon and 25% oxygen. A ratio as claimed by Applicant is merely a design choice and would not require undue experimentation.

43. For claims 58 and 93, Applicant requires capacitive discharge etching. For claim 65, Applicant requires inductively coupled plasma etching. As noted above, Jurgensen renders the limitations obvious.

44. For claims 60, 94, and 95, Applicant requires the electrode to have a substantially planar electrode parallel to each other. Marshall discloses the limitations (Figure 1).

45. For claim 131, Applicant requires a plurality of targets to be used. For claim 132, Applicant requires moving the targets from a covered position to an exposed position. When the targets are swung out of the chamber, they are exposed, and when they are in the chamber, they are covered from the outside in Marshall.

46. For claim 158, Applicant requires an apparatus comprising a processing chamber, a sample stage, means for detecting a first position of the specimen; wherein the stage is moved automatically to the processing positions. For claims 159 and 162, Applicant requires the first position to be measures relative to a second position. For claims 160 and 163, Applicant requires

Art Unit: 1753

performing one or more of etching, and cleaning. For claim 161, Applicant requires an apparatus comprising a processing chamber, sample stage, beam generating device and beam sensor; wherein the stage is moved to the processing positions. For claim 164, the beam is a laser. A laser is a conventionally used and well-known processing beam. The means for detecting are inherently present in Marshall's inline apparatus else there would be a significant amount of waste that occurs when material is sputtered deposited without a substrate present.

Allowable Subject Matter

47. Claims 23, 25, 29, 47, 49, 57, 92, and 117 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, 2nd paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

48. Claims 22, 24, 26-28, 30, 31, 46, 48, 50-54, 56, 75, 91, 97, 101, 116, 123-126, 130, 133-137, and 142-150 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

General Information

For general status inquiries on applications not having received a first action on the merits, please contact the Technology Center 1700 receptionist at (571) 272-1700.

For inquiries involving Recovery of lost papers & cases, sending out missing papers, resetting shortened statutory periods, or for restarting the shortened statutory period for response, please contact Denis Boyd at (571) 272-0992.

For general inquiries such as fees, hours of operation, and employee location, please contact the Technology Center 1700 receptionist at (571) 272-1300.

Art Unit: 1753

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Steven H. VerSteeg whose telephone number is (571) 272-1348. The examiner can normally be reached on Mon - Thurs (6:30 AM - 5:00 PM).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam X. Nguyen can be reached on (571) 272-1342. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Steven H VerSteeg
Primary Examiner
Art Unit 1753

shv
September 1, 2005